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Analytical Report

Fluorochemical Characterization of Aqueous Samples

MPI Report No. L0020078

Testing Laboratory

MPI Research, Inc.
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Requester

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1 Introduction

Results are reported for the analysis of twelve water samples received at MPI Research from the University of Georgia. The MPI Research study number assigned to the project is L0020078. Table I lists the target analyte quantitated for the sample.

Table I. Target Analyte for Quantitation

Compound Name	Acronym	Analysis
Perfluorobutyric Acid	C4 Acid	LC/MS/MS
Perfluoropentanoic Acid	C5 Acid	LC/MS/MS
Perfluorohexanoic Acid	C6 Acid	LC/MS/MS
Perfluoroheptanoic Acid	C7 Acid	LC/MS/MS
Perfluorooctanoic Acid	C8 Acid	LC/MS/MS
Perfluorononanoic Acid	C9 Acid	LC/MS/MS
Perfluorodecanoic Acid	C10 Acid	LC/MS/MS
Perfluoroundecanoic Acid	C11 Acid	LC/MS/MS
Perfluorododecanoic Acid	C12 Acid	LC/MS/MS
Perfluorotridecanoic Acid	C13 Acid	LC/MS/MS
Perfluorotetradecanoic Acid	C14 Acid	LC/MS/MS
Perfluorobutanesulfonate	C4 Sulfonate or PFBS	LC/MS/MS
Perfluorohexanesulfonate	C6 Sulfonate or PFHS	LC/MS/MS
Perfluoroheptanesulfonate	C7 Sulfonate or PFOS	LC/MS/MS
Perfluorooctanesulfonate	C8 Sulfonate or PFOS	LC/MS/MS
Perfluorodecanesulfonate	C10 Sulfonate or PFOS	LC/MS/MS
Perfluorooctanesulfonamide	FOSA	LC/MS/MS
2-(N-methylperfluorooctanesulfonamido)	MeFOSAA	LC/MS/MS
2-(N-ethylperfluorooctanesulfonamide)	EtFOSAA	LC/MS/MS
N-methylperfluorooctane	MeFOSE	LC/MS/MS
N-ethylperfluorooctane	EtFOSE	LC/MS/MS
6:2 Fluorotelomer alcohol	6:2 FTOH	GC/MS
7:2 sFluorotelomer alcohol	7:2s FTOH	GC/MS
8:2 Fluorotelomer alcohol	8:2 FTOH	GC/MS
10:2 Fluorotelomer alcohol	10:2 FTOH	GC/MS

2 Sample Receipt

Twelve water samples were received from the client on 1/21/10 and given the MPI Research login number of L0020078. Wet ice was depleted upon receipt to the lab. As per client, please proceed with the analysis. The samples were stored refrigerated from receipt until analysis. Chain-of-custody information is presented in Attachment A.

3 Methods - Analytical and Preparatory

3.1 Water Sample Preparation for LC/MS/MS

Ten milliliters of sample was transferred into a 50 mL centrifuge tube. Ten milliliters of acetonitrile was added to the sample. After shaking, the sample was sonicated for approximately 2 hours then centrifuged at 3000 rpm for ~10 minutes. A 1 mL portion of the supernatant was transferred to an autosampler vial and fortified with an internal standard solution. The samples were then analyzed using electrospray LC/MS/MS.

3.2 Water Sample Preparation for GC/MS

One hundred milliliters of sample was transferred into a 250 mL polypropylene bottle. Forty milliliter of methyl tert-butyl ether (MTBE) was added to the bottle. The bottle was capped and then shaken for one hour on a reciprocation shaker. The content of the bottle was poured into a 250 mL separatory funnel. The bottle was rinsed with approximately 10 mL fresh MTBE and the rinsate was added to the separatory funnel. The aqueous phase in the funnel was discarded. The organic phase was collected in a 300 mL flask and dried with sodium sulfate. The dried organic phase was then quantitatively transferred into a 50 mL polypropylene centrifuge tube and concentrated to 1 mL using a nitrogen evaporator. The extracted was transferred into a 2 mL GC vial and 10 μL of internal standard was added. The sample was then analyzed by GC/MS.

3.3 Sample Analysis by LC/MS/MS

In High Pressure Liquid Chromatography (HPLC), an aliquot of extract is injected and passed through a liquid-phase chromatographic column. Based on the affinity of the analyte for the stationary phase in the column relative to the liquid mobile phase, the analyte is retained for a characteristic amount of time. Following HPLC separation, mass spectrometry provides a rapid and accurate means for analyzing a wide range of organic compounds. Molecules are ionized, fragmented, and detected. The ions characteristic of the compounds are observed and quantitated against calibration standards.

An HP1100 system interfaced to an Applied Biosystems API 4000 and 5000 LC/MS/MS was used to analyze the sample extracts for quantitation. A gradient elution through a Phenomenex Luna 3μ C8(2) Mercury, 20 x 4.0 mm column was used for separation.

The following gradient was performed for C4-C14 acids, PFBS, PFHS, PFHpS, PFOS, PFDS, FOSA, and ^{13}C PFOA (m+4):

Mobile Phase (A):	2mM Ammonium Acetate in Water	
Mobile Phase (B):	Methanol	
Time	%A	%B
0.0	90	10
0.5	90	10

2.0	10	90
5.0	10	90
5.1	0	100
6.0	0	100
6.1	90	10
10.0	90	10

The following gradient was performed for MeFOSAA, EtFOSAA, MeFOSE and EtFOSE:

Mobile Phase (A): 2mM Ammonium Acetate in Water
Mobile Phase (B): Methanol

Time	%A	%B
0.0	75	25
0.5	75	25
2.0	10	90
5.0	10	90
5.1	0	100
6.0	0	100
6.1	75	25
10.0	75	25

The following parameters were used for operation of the mass spectrometer:

Parameter	Setting
Ionization Mode	Electrospray
Polarity	Negative
Transitions Monitored	213→169 (C4 Acid) 263→219 (C5 Acid) 313→269 (C6 Acid) 363→319 (C7 Acid) 413→369 (C8 Acid) 463→419 (C9 Acid) 513→469 (C10 Acid) 563→519 (C11 Acid) 613→569 (C12 Acid) 663→619 (C13 Acid) 713→669 (C14 Acid) 299→80 (PFBS) 399→80 (PFHS) 449→99 (PFHpS) 499→80 (PFOS) 599→99 (PFDS) 498→78 (FOSA) 217→172 (Internal Std. ^{13}C PFBA (m+4)) 415→370 (Internal Std. ^{13}C PFOA (m+2)) 515→470 (Internal Std. ^{13}C PFDA (m+2)) 503→80 (Internal Std. ^{13}C PFOS (m+4)) 417→372 (Surrogate ^{13}C PFOA (m+4)) 570→419 (MeFOSAA) 584→419 (EtFOSAA) 616→59 (MeFOSE) 630→59 (EtFOSE)
Gas Temperature	400°C

3.4 Sample Analysis by GC/MS

The extracts were injected into a gas chromatograph (GC) equipped with a narrow bore capillary column and mass selective detector. The GC was temperature programmed to separate the analytes, and the analytes eluted from the column were introduced to the mass selective detector and identified by comparing retention times and abundances of characteristic masses to that of known standards. Sample concentration was calculated by comparing the response of the characteristic mass relative to that of the calibration curve.

The GC/MS system was operated using the following conditions:

Instrument	Hewlett-Packard model 6890 Series Gas Chromatograph/model 5973 Mass Selective Detector
Column	HP-1, 30 m x 0.25 mm ID, 1.00 μm df
Oven Temperature	Hold at 60°C for 4 min., ramp at 20°C/min. to 140°C, ramp at 40°C to 240°C, hold for 5 minutes
Injector Temperature	200 °C
Transfer Line Temperature	280 °C
Carrier Gas	Helium
Column Flow	1.0 mL/min, Constant
Injection Mode	Pulsed Splitless, 30psi for 1.5 min.
Injection Liner	4 mm ID Single Gooseneck packed with glass wool
Injection Purge Delay	1.5 min.
Purge Flow to Split Vent	50 mL/min.
Injection Volume	2 μL
Electron Multiplier Voltage	From ATUNE + 306V
MS Acquisition Mode	SIM
Ions Monitored	MFOET (Internal Standard): m/z 448, m/z 466 8:1 FTOH (Surrogate): m/z 363, m/z 431 6:2 FTOH: m/z 344, m/z 363 7:2s FTOH: m/z 319, m/z 355 8:2 FTOH: m/z 405, m/z 463 10:2 FTOH: m/z 505, m/z 544
Dwell Time	50ms for each ion
MS Temperature	Quad: 150 °C, Source: 230 °C

4 Analysis by LCMSMS

4.1 Calibration

A 9-point calibration curve was analyzed at the beginning of the analytical sequence for C4-C14 acids, PFBS, PFHS, PFHpS, PFOS, PFDS, FOSA, and ^{13}C PFOA (m+4). A continuing calibration verification (CCV) standard (0.250 ng/mL) was used to verify the accuracy of the calibration curve for the duration of the analytical run. At the minimum every tenth sample was a CCV, not including solvent blanks. The calibration curve and the last passing CCV (70-130%) will then bracket acceptable samples. The calibration points were prepared at 0.0125, 0.025, 0.050, 0.100, 0.250, 0.500, 1.0, 2.5 and 5.0 ng/mL (ppb) for LC/MS/MS analysis. The

ratio of the analyte concentration to the IS concentration versus the ratio of the analyte instrument response (area) to the IS response (area) was plotted for each point. Using linear regression with 1/x weighting, the slope, y-intercept and coefficient of determination (r^2) were determined. A calibration curve is acceptable if $r^2 \geq 0.985$.

A 9-point calibration curve was analyzed at the beginning of the analytical sequence for MeFOSAA, EtFOSSA, MeFOSE and EtFOSE. A continuing calibration verification (CCV) standard (0.250 ng/mL) was used to verify the accuracy of the calibration curve for the duration of the analytical run. At the minimum every tenth sample was a CCV, not including solvent blanks. The calibration curve and the last passing CCV (70-130%) will then bracket acceptable samples. The calibration points were prepared at 0.0125, 0.025, 0.050, 0.100, 0.250, 0.500, 1.0, 2.5 and 5.0 ng/mL (ppb) for LC/MS/MS analysis. The instrument response versus the concentration was plotted for each point. Using quadratic regression with 1/x weighting, the X variable 1 (a), X variable 2 (b), intercept (c) and coefficient of determination (r^2) were determined. A calibration curve is acceptable if $r^2 \geq 0.985$

For the results reported here, calibration criteria were met. The calibration curve is included in the raw data in Attachment C.

4.2 Surrogates and Internal Standards

^{13}C labeled-perfluorooctanoic acid (^{13}C PFOA (m+4)) is used as a surrogate for the water samples.

^{13}C PFOA (m+4) recoveries can be found in Attachment B.

^{13}C PFBA (m+4) is used as the internal standard for the water samples for C4 – C6 Acids.

^{13}C PFOA (m+2) is used as the internal standard for the water samples for C7 – C9 Acids.

^{13}C PFDA (m+2) is used as the internal standard for the water samples for C10 – C14 Acids.

^{13}C PFOS (m+4) is used as the internal standard for the water samples for PFBS, PFHS, PFOS and FOSA

L20078-28 (45-1) was inadvertently spiked with 10 μL instead of 5 μL of internal standard mix. This will have no effect on the results.

4.3 Laboratory Control Spikes

Laboratory control spikes in the analytical set were prepared during each extraction set by adding a known concentration of the analyte to laboratory reagents. Laboratory control spikes are used to assess method accuracy. The laboratory control spikes must show recoveries between 70-130% or the data is rejected. For the results reported here, the laboratory control spikes were within the acceptable range. Laboratory control spike recoveries are given in Attachment B.

4.4 Matrix Spikes

Two matrix spikes were prepared for the water samples, one for C4-C14 acids, PFBS, PFHS, PFHpS, PFOS, PFDS, FOSA, and ^{13}C PFOA (m+4) analysis, and one for MeFOSAA, EtFOSSA, MeFOSE and EtFOSE analysis. They were prepared by adding a known concentration of the target analyte to a separate sample. Matrix spikes are used to assess

method accuracy in the matrix. The matrix spike should show recoveries between 70-130%. For the results reported here, the matrix spike was within the acceptable range with the exception of:

L20078-1 (36-1) Spk C at 0.1 ng/mL MeFOSE, EtFOSE and 1.0 ng/mL for C7, C9, C12, C13 acids, and PFHpS were outside the acceptable recoveries of 70-130%. Samples were re-extracted. Matrix effect was determined with the following still outside the acceptable recoveries of 70-130%; L20078-1 (36-1) Spk C at 0.1 ng/mL for MeFOSE, EtFOSE, C7 acid, and C9 acid.

Matrix spike recoveries are given in Attachment B.

4.5 Duplicate

Laboratory duplicates were not performed as part of this study.

5 Analysis by GC/MS

5.1 System Suitability and Calibration

Three system suitability standards were analyzed at the beginning of the analytical sequence. The %RSD of the peak area of each analyte should be ≤ 20.

A 6-point calibration was analyzed. The calibration standard analyses were interspersed throughout the analytical sequence. The calibration points were prepared at 0.1, 0.2, 0.5, 1.0, 2.0 and 5.0 µg/mL, which are equivalent to 1, 2, 5, 10, 20 and 50 µg/L (ppb) in samples. A calibration curve is acceptable if $r^2 \geq 0.985$.

For the results reported here, system suitablility and calibration criteria were met. The system suitability and calibration curve are included in the raw data in Attachment D.

5.2 Surrogate and Internal Standard

1H,1H-Perfluoro-1-nonanol (8:1 FTOH) was used as surrogate standard. The recoveries of 8:1 FTOH can be found in Attachment B.

2-Perfluorooctyl-[1,1-2H2]-[1,2-13C2]-ethanol (MFOET) was used as internal standard.

5.3 Laboratory Control Spikes

Laboratory control spikes in the analytical set were prepared during each extraction set by adding a known concentration of the analyte to laboratory reagents. Laboratory control spikes are used to assess method accuracy. The laboratory control spikes must show recoveries between 50-120%. For the results reported here, the laboratory control spikes were within the acceptable range. Laboratory control spike recoveries are given in Attachment B.

5.4 Duplicate

A laboratory duplicate sample was performed for sample 36-3.

5.5 Matrix Spike

Matrix Spike was prepared for sample 37-3 by adding a known concentration of the target analyte to a separate aliquot of sample. Matrix spike is used to assess method accuracy in the matrix. The matrix spike should show recoveries between 50-120%. For the results reported here, the matrix spike recoveries were within the acceptable range with the exception of 10:2 FTOH.

Matrix spike recoveries are given in Attachment B.

6 Data Summary

6.1 GC/MS Sample Results

Five samples (40-3, 41-3, 42-3, 45-3 and SD3) were re-extracted due to surrogate recoveries lower than 50%. Upon re-extraction the surrogate recoveries of the four samples were still below 50%. The low recovery may be due to the matrix effect of the sample. For each of the five samples that were re-extracted, the extraction with the higher recovery was reported.

The surrogate recoveries for samples 36-3 and 37-3 were less than 50%. The low recoveries are due to matrix effect of the sample and were confirmed with the analyses of 36-3 Duplicate and 37-3 Matrix Spike.

The surrogate recovery for the laboratory spike duplicate (LCSD) performed on 2/12/10 was marginally less than 50%. However, the spike recoveries were all within the 50-120% acceptance limit. The samples associated with this LCSD were not re-extracted.

The results are reported in parts per billion (ng/mL) on an as-received basis.

Please see Attachment B for a detailed listing of the analytical results.

7 Data/Sample Retention

~~Samples are disposed of one month after the report is issued unless otherwise specified.~~ All electronic data is archived on retrievable media and hard copy reports are stored in data folders maintained by MPI Research. Hardcopy data is stored for a minimum of five years. The client will be notified 30 days prior to the disposal of hardcopy data.

8 Attachments

7.1 Attachment A: Chain of Custody

7.2 Attachment B: Analytical Results

7.3 Attachment C: Raw Analytical Data (LC/MS/MS)

7.4 Attachment D: Raw Analytical Data (GC/MS)

9 Signatures

Gary Oden Jr., Research Chemist Associate II — Date 02/16/10

Ashley Unaegbu, Research Chemist Associate I — Date 2/16/10

Xiang Zhu, Manager, Analytical — Date 2/16/10

Other Lab Member Contributed to the Report:

Robert Wolford

B

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Analytical Report

Fluorochemical Residues in Water Samples By LC/MS/MS

Sample ID: L0020078-1; 36-1

Analyte	Amount Found (ng/mL)	LOD (ng/mL)	Analysis Date
C4 Acid- Perfluorobutyric Acid	ND	0.0125	1/29/2010
C5 Acid- Perfluoropentanoic Acid	ND	0.0125	1/29/2010
C6 Acid- Perfluorohexanoic Acid	ND	0.0125	1/29/2010
C7 Acid- Perfluoroheptanoic Acid	ND	0.0125	1/29/2010
C8 Acid- Perfluorooctanoic Acid	ND	0.0125	1/29/2010
C9 Acid- Perfluorononanoic Acid	ND	0.0125	1/29/2010
C10 Acid- Perfluorodecanoic Acid	ND	0.0125	1/29/2010
C11 Acid- Perfluoroundecanoic Acid	ND	0.0125	1/29/2010
C12 Acid- Perfluorododecanoic Acid	ND	0.0125	2/1/2010
C13 Acid- Perfluorotridecanoic Acid	ND	0.0125	2/1/2010
C14 Acid- Perfluorotetradecanoic Acid	ND	0.0125	1/29/2010
PFBS- Perfluorobutanesulfonate	NQ	0.0125	1/29/2010
PFHS- Perfluorohexanesulfonate	ND	0.0125	1/29/2010
PFOS- Perfluorooctanesulfonate	2.56	0.0125	1/29/2010
FOSA- Perfluorooctane sulfonamide	ND	0.0125	1/29/2010
PFHpS- Perfluoroheptanesulfonate	ND	0.0125	2/1/2010
PFDS- Perfluorodecanesulfonate	ND	0.0125	1/29/2010
MeFOSAA- 2(N-Methylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
EtFOSAA- 2(N-Ethylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
MeFOSE- N-Methylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010
EtFOSE- N-Ethylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010

ND = Not detected = Response is below the LOD of 0.0125 ng/mL (ppb).
NQ = Not quantifiable = Response is between the LOD and the LOQ of 0.0250 ng/mL (ppb).

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: L0020078-3; 36-3
Date of Extraction: 1/27/2010
Date Analyzed: 1/28/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	ND	1.00
8-2 FTOH	1.70	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: L0020078-3; 36-3 Duplicate
Date of Extraction: 1/27/2010
Date Analyzed: 1/28/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	ND	1.00
8-2 FTOH	1.30	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Fluorochemical Residues in Water Samples By LC/MS/MS

Sample ID: L0020078-4; 37-1

Analyte	Amount Found (ng/mL)	LOD (ng/mL)	Analysis Date
C4 Acid- Perfluorobutyric Acid	ND	0.0125	1/29/2010
C5 Acid- Perfluoropentanoic Acid	NQ	0.0125	1/29/2010
C6 Acid- Perfluorohexanoic Acid	ND	0.0125	1/29/2010
C7 Acid- Perfluoroheptanoic Acid	ND	0.0125	1/29/2010
C8 Acid- Perfluorooctanoic Acid	ND	0.0125	1/29/2010
C9 Acid- Perfluorononanoic Acid	ND	0.0125	1/29/2010
C10 Acid- Perfluorodecanoic Acid	ND	0.0125	1/29/2010
C11 Acid- Perfluoroundecanoic Acid	ND	0.0125	1/29/2010
C12 Acid- Perfluorododecanoic Acid	ND	0.0125	1/29/2010
C13 Acid- Perfluorotridecanoic Acid	ND	0.0125	1/29/2010
C14 Acid- Perfluorotetradecanoic Acid	ND	0.0125	1/29/2010
PFBS- Perfluorobutanesulfonate	0.0308	0.0125	1/29/2010
PFHS- Perfluorohexanesulfonate	ND	0.0125	1/29/2010
PFOS- Perfluorooctanesulfonate	4.17	0.0125	1/29/2010
FOSA- Perfluorooctane sulfonamide	ND	0.0125	1/29/2010
PFHpS- Perfluoroheptanesulfonate	ND	0.0125	1/29/2010
PFDS- Perfluorodecanesulfonate	ND	0.0125	1/29/2010
MeFOSAA- 2(N-Methylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
EtFOSAA- 2(N-Ethylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
MeFOSE- N-Methylperfluorooctane sulfonamidoethanol	0.0321	0.0125	1/28/2010
EtFOSE- N-Ethylperfluorooctane sulfonamidoethanol	0.249	0.0125	1/28/2010

ND = Not detected = Response is below the LOD of 0.0125 ng/mL (ppb).
NQ = Not quantifiable = Response is between the LOD and the LOQ of 0.0250 ng/mL (ppb).

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: L0020078-6; 37-3
Date of Extraction: 1/27/2010
Date Analyzed: 1/28/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	ND	1.00
8-2 FTOH	ND	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Fluorochemical Residues in Water Samples By LC/MS/MS

Sample ID: L0020078-7; 38-1

Analyte	Amount Found (ng/mL)	LOD (ng/mL)	Analysis Date
C4 Acid- Perfluorobutyric Acid	ND	0.0125	1/29/2010
C5 Acid- Perfluoropentanoic Acid	0.0311	0.0125	1/29/2010
C6 Acid- Perfluorohexanoic Acid	NQ	0.0125	1/29/2010
C7 Acid- Perfluoroheptanoic Acid	NQ	0.0125	1/29/2010
C8 Acid- Perfluorooctanoic Acid	0.0703	0.0125	1/29/2010
C9 Acid- Perfluorononanoic Acid	ND	0.0125	1/29/2010
C10 Acid- Perfluorodecanoic Acid	ND	0.0125	1/29/2010
C11 Acid- Perfluoroundecanoic Acid	ND	0.0125	1/29/2010
C12 Acid- Perfluorododecanoic Acid	ND	0.0125	1/29/2010
C13 Acid- Perfluorotridecanoic Acid	ND	0.0125	1/29/2010
C14 Acid- Perfluorotetradecanoic Acid	ND	0.0125	1/29/2010
PFBS- Perfluorobutanesulfonate	NQ	0.0125	1/29/2010
PFHS- Perfluorohexanesulfonate	ND	0.0125	1/29/2010
PFOS- Perfluorooctanesulfonate	0.0574	0.0125	1/29/2010
FOSA- Perfluorooctane sulfonamide	ND	0.0125	1/29/2010
PFHpS- Perfluoroheptanesulfonate	ND	0.0125	1/29/2010
PFDS- Perfluorodecanesulfonate	ND	0.0125	1/29/2010
MeFOSAA- 2(N-Methylperfluorooctanesulfonamido) acetic acid	0.0267	0.0125	1/28/2010
EtFOSAA- 2(N-Ethylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
MeFOSE- N-Methylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010
EtFOSE- N-Ethylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010

ND = Not detected = Response is below the LOD of 0.0125 ng/mL (ppb).
NQ = Not quantifiable = Response is between the LOD and the LOQ of 0.0250 ng/mL (ppb).

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: L0020078-9; 38-3
Date of Extraction: 1/27/2010
Date Analyzed: 1/28/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	ND	1.00
8-2 FTOH	ND	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Fluorochemical Residues in Water Samples By LC/MS/MS

Sample ID: L0020078-10; 39-1

Analyte	Amount Found (ng/mL)	LOD (ng/mL)	Analysis Date
C4 Acid- Perfluorobutyric Acid	ND	0.0125	1/29/2010
C5 Acid- Perfluoropentanoic Acid	0.0265	0.0125	1/29/2010
C6 Acid- Perfluorohexanoic Acid	ND	0.0125	1/29/2010
C7 Acid- Perfluoroheptanoic Acid	ND	0.0125	1/29/2010
C8 Acid- Perfluorooctanoic Acid	0.0495	0.0125	1/29/2010
C9 Acid- Perfluorononanoic Acid	ND	0.0125	1/29/2010
C10 Acid- Perfluorodecanoic Acid	ND	0.0125	1/29/2010
C11 Acid- Perfluoroundecanoic Acid	ND	0.0125	1/29/2010
C12 Acid- Perfluorododecanoic Acid	ND	0.0125	1/29/2010
C13 Acid- Perfluorotridecanoic Acid	ND	0.0125	1/29/2010
C14 Acid- Perfluorotetradecanoic Acid	ND	0.0125	1/29/2010
PFBS- Perfluorobutanesulfonate	ND	0.0125	1/29/2010
PFHS- Perfluorohexanesulfonate	ND	0.0125	1/29/2010
PFOS- Perfluorooctanesulfonate	0.0284	0.0125	1/29/2010
FOSA- Perfluorooctane sulfonamide	ND	0.0125	1/29/2010
PFHpS- Perfluoroheptanesulfonate	ND	0.0125	1/29/2010
PFDS- Perfluorodecanesulfonate	ND	0.0125	1/29/2010
MeFOSAA- 2(N-Methylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
EtFOSAA- 2(N-Ethylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
MeFOSE- N-Methylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010
EtFOSE- N-Ethylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010

ND = Not detected = Response is below the LOD of 0.0125 ng/mL (ppb).
NQ = Not quantifiable = Response is between the LOD and the LOQ of 0.0250 ng/mL (ppb).

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: L0020078-12; 39-3
Date of Extraction: 1/27/2010
Date Analyzed: 1/28/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	1.20	1.00
8-2 FTOH	ND	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Fluorochemical Residues in Water Samples By LC/MS/MS

Sample ID: L0020078-13; 40-1

Analyte	Amount Found (ng/mL)	LOD (ng/mL)	Analysis Date
C4 Acid- Perfluorobutyric Acid	ND	0.0125	1/29/2010
C5 Acid- Perfluoropentanoic Acid	ND	0.0125	1/29/2010
C6 Acid- Perfluorohexanoic Acid	ND	0.0125	1/29/2010
C7 Acid- Perfluoroheptanoic Acid	ND	0.0125	1/29/2010
C8 Acid- Perfluorooctanoic Acid	NQ	0.0125	1/29/2010
C9 Acid- Perfluorononanoic Acid	0.0266	0.0125	1/29/2010
C10 Acid- Perfluorodecanoic Acid	ND	0.0125	1/29/2010
C11 Acid- Perfluoroundecanoic Acid	ND	0.0125	1/29/2010
C12 Acid- Perfluorododecanoic Acid	ND	0.0125	1/29/2010
C13 Acid- Perfluorotridecanoic Acid	ND	0.0125	1/29/2010
C14 Acid- Perfluorotetradecanoic Acid	ND	0.0125	1/29/2010
PFBS- Perfluorobutanesulfonate	ND	0.0125	1/29/2010
PFHS- Perfluorohexanesulfonate	ND	0.0125	1/29/2010
PFOS- Perfluorooctanesulfonate	0.630	0.0125	1/29/2010
FOSA- Perfluorooctane sulfonamide	ND	0.0125	1/29/2010
PFHpS- Perfluoroheptanesulfonate	ND	0.0125	1/29/2010
PFDS- Perfluorodecanesulfonate	ND	0.0125	1/29/2010
MeFOSAA- 2(N-Methylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
EtFOSAA- 2(N-Ethylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
MeFOSE- N-Methylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010
EtFOSE- N-Ethylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010

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NQ = Not quantifiable = Response is between the LOD and the LOQ of 0.0250 ng/mL (ppb).

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: L0020078-15; 40-3
Date of Extraction: 2/12/2010
Date Analyzed: 2/12/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	6.30	1.00
8-2 FTOH	ND	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Fluorochemical Residues in Water Samples By LC/MS/MS

Sample ID: L0020078-16; 41-1

Analyte	Amount Found (ng/mL)	LOD (ng/mL)	Analysis Date
C4 Acid- Perfluorobutyric Acid	ND	0.0125	1/29/2010
C5 Acid- Perfluoropentanoic Acid	ND	0.0125	1/29/2010
C6 Acid- Perfluorohexanoic Acid	ND	0.0125	1/29/2010
C7 Acid- Perfluoroheptanoic Acid	ND	0.0125	1/29/2010
C8 Acid- Perfluorooctanoic Acid	0.0266	0.0125	1/29/2010
C9 Acid- Perfluorononanoic Acid	0.0765	0.0125	1/29/2010
C10 Acid- Perfluorodecanoic Acid	ND	0.0125	1/29/2010
C11 Acid- Perfluoroundecanoic Acid	ND	0.0125	1/29/2010
C12 Acid- Perfluorododecanoic Acid	ND	0.0125	1/29/2010
C13 Acid- Perfluorotridecanoic Acid	ND	0.0125	1/29/2010
C14 Acid- Perfluorotetradecanoic Acid	ND	0.0125	1/29/2010
PFBS- Perfluorobutanesulfonate	ND	0.0125	1/29/2010
PFHS- Perfluorohexanesulfonate	ND	0.0125	1/29/2010
PFOS- Perfluorooctanesulfonate	1.26	0.0125	1/29/2010
FOSA- Perfluorooctane sulfonamide	ND	0.0125	1/29/2010
PFHpS- Perfluoroheptanesulfonate	ND	0.0125	1/29/2010
PFDS- Perfluorodecanesulfonate	ND	0.0125	1/29/2010
MeFOSAA- 2(N-Methylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
EtFOSAA- 2(N-Ethylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
MeFOSE- N-Methylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010
EtFOSE- N-Ethylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: L0020078-18; 41-3
Date of Extraction: 2/12/2010
Date Analyzed: 2/12/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	6.60	1.00
8-2 FTOH	ND	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Fluorochemical Residues in Water Samples By LC/MS/MS

Sample ID: L0020078-19; 42-1

Analyte	Amount Found (ng/mL)	LOD (ng/mL)	Analysis Date
C4 Acid- Perfluorobutyric Acid	ND	0.0125	1/29/2010
C5 Acid- Perfluoropentanoic Acid	0.0412	0.0125	1/29/2010
C6 Acid- Perfluorohexanoic Acid	ND	0.0125	1/29/2010
C7 Acid- Perfluoroheptanoic Acid	ND	0.0125	1/29/2010
C8 Acid- Perfluorooctanoic Acid	ND	0.0125	1/29/2010
C9 Acid- Perfluorononanoic Acid	ND	0.0125	1/29/2010
C10 Acid- Perfluorodecanoic Acid	ND	0.0125	1/29/2010
C11 Acid- Perfluoroundecanoic Acid	ND	0.0125	1/29/2010
C12 Acid- Perfluorododecanoic Acid	ND	0.0125	1/29/2010
C13 Acid- Perfluorotridecanoic Acid	ND	0.0125	1/29/2010
C14 Acid- Perfluorotetradecanoic Acid	ND	0.0125	1/29/2010
PFBS- Perfluorobutanesulfonate	ND	0.0125	1/29/2010
PFHS- Perfluorohexanesulfonate	ND	0.0125	1/29/2010
PFOS- Perfluorooctanesulfonate	0.316	0.0125	1/29/2010
FOSA- Perfluorooctane sulfonamide	ND	0.0125	1/29/2010
PFHpS- Perfluoroheptanesulfonate	ND	0.0125	1/29/2010
PFDS- Perfluorodecanesulfonate	ND	0.0125	1/29/2010
MeFOSAA- 2(N-Methylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
EtFOSAA- 2(N-Ethylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
MeFOSE- N-Methylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010
EtFOSE- N-Ethylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: L0020078-21; 42-3
Date of Extraction:1/27/2010
Date Analyzed: 1/28/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	ND	1.00
8-2 FTOH	ND	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Fluorochemical Residues in Water Samples By LC/MS/MS

Sample ID: L0020078-22; 43-1

Analyte	Amount Found (ng/mL)	LOD (ng/mL)	Analysis Date
C4 Acid- Perfluorobutyric Acid	ND	0.0125	1/29/2010
C5 Acid- Perfluoropentanoic Acid	ND	0.0125	1/29/2010
C6 Acid- Perfluorohexanoic Acid	ND	0.0125	1/29/2010
C7 Acid- Perfluoroheptanoic Acid	ND	0.0125	1/29/2010
C8 Acid- Perfluorooctanoic Acid	ND	0.0125	1/29/2010
C9 Acid- Perfluorononanoic Acid	ND	0.0125	1/29/2010
C10 Acid- Perfluorodecanoic Acid	ND	0.0125	1/29/2010
C11 Acid- Perfluoroundecanoic Acid	ND	0.0125	1/29/2010
C12 Acid- Perfluorododecanoic Acid	ND	0.0125	1/29/2010
C13 Acid- Perfluorotridecanoic Acid	ND	0.0125	1/29/2010
C14 Acid- Perfluorotetradecanoic Acid	ND	0.0125	1/29/2010
PFBS- Perfluorobutanesulfonate	ND	0.0125	1/29/2010
PFHS- Perfluorohexanesulfonate	ND	0.0125	1/29/2010
PFOS- Perfluorooctanesulfonate	ND	0.0125	1/29/2010
FOSA- Perfluorooctane sulfonamide	ND	0.0125	1/29/2010
PFHpS- Perfluoroheptanesulfonate	ND	0.0125	1/29/2010
PFDS- Perfluorodecanesulfonate	ND	0.0125	1/29/2010
MeFOSAA- 2(N-Methylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
EtFOSAA- 2(N-Ethylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
MeFOSE- N-Methylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010
EtFOSE- N-Ethylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: L0020078-24; 43-3
Date of Extraction: 1/27/2010
Date Analyzed: 1/28/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	ND	1.00
8-2 FTOH	ND	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Fluorochemical Residues in Water Samples By LC/MS/MS

Sample ID: L0020078-25; 44-1

Analyte	Amount Found (ng/mL)	LOD (ng/mL)	Analysis Date
C4 Acid- Perfluorobutyric Acid	ND	0.0125	1/29/2010
C5 Acid- Perfluoropentanoic Acid	ND	0.0125	1/29/2010
C6 Acid- Perfluorohexanoic Acid	NQ	0.0125	1/29/2010
C7 Acid- Perfluoroheptanoic Acid	ND	0.0125	1/29/2010
C8 Acid- Perfluorooctanoic Acid	0.0791	0.0125	1/29/2010
C9 Acid- Perfluorononanoic Acid	0.0631	0.0125	1/29/2010
C10 Acid- Perfluorodecanoic Acid	ND	0.0125	1/29/2010
C11 Acid- Perfluoroundecanoic Acid	ND	0.0125	1/29/2010
C12 Acid- Perfluorododecanoic Acid	ND	0.0125	1/29/2010
C13 Acid- Perfluorotridecanoic Acid	ND	0.0125	1/29/2010
C14 Acid- Perfluorotetradecanoic Acid	ND	0.0125	1/29/2010
PFBS- Perfluorobutanesulfonate	0.0453	0.0125	1/29/2010
PFHS- Perfluorohexanesulfonate	ND	0.0125	1/29/2010
PFOS- Perfluorooctanesulfonate	0.0942	0.0125	1/29/2010
FOSA- Perfluorooctane sulfonamide	ND	0.0125	1/29/2010
PFHpS- Perfluoroheptanesulfonate	ND	0.0125	1/29/2010
PFDS- Perfluorodecanesulfonate	ND	0.0125	1/29/2010
MeFOSAA- 2(N-Methylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
EtFOSAA- 2(N-Ethylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
MeFOSE- N-Methylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010
EtFOSE- N-Ethylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: L0020078-27; 44-3
Date of Extraction: 1/27/2010
Date Analyzed: 1/28/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	ND	1.00
8-2 FTOH	ND	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Fluorochemical Residues in Water Samples By LC/MS/MS

Sample ID: L0020078-28; 45-1

Analyte	Amount Found (ng/mL)	LOD (ng/mL)	Analysis Date
C4 Acid- Perfluorobutyric Acid	ND	0.0125	1/29/2010
C5 Acid- Perfluoropentanoic Acid	ND	0.0125	1/29/2010
C6 Acid- Perfluorohexanoic Acid	ND	0.0125	1/29/2010
C7 Acid- Perfluoroheptanoic Acid	ND	0.0125	1/29/2010
C8 Acid- Perfluorooctanoic Acid	ND	0.0125	1/29/2010
C9 Acid- Perfluorononanoic Acid	ND	0.0125	1/29/2010
C10 Acid- Perfluorodecanoic Acid	ND	0.0125	1/29/2010
C11 Acid- Perfluoroundecanoic Acid	ND	0.0125	1/29/2010
C12 Acid- Perfluorododecanoic Acid	ND	0.0125	1/29/2010
C13 Acid- Perfluorotridecanoic Acid	ND	0.0125	1/29/2010
C14 Acid- Perfluorotetradecanoic Acid	ND	0.0125	1/29/2010
PFBS- Perfluorobutanesulfonate	0.0357	0.0125	1/29/2010
PFHS- Perfluorohexanesulfonate	ND	0.0125	1/29/2010
PFOS- Perfluorooctanesulfonate	0.0260	0.0125	1/29/2010
FOSA- Perfluorooctane sulfonamide	ND	0.0125	1/29/2010
PFHpS- Perfluoroheptanesulfonate	ND	0.0125	1/29/2010
PFDS- Perfluorodecanesulfonate	ND	0.0125	1/29/2010
MeFOSAA- 2(N-Methylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
EtFOSAA- 2(N-Ethylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
MeFOSE- N-Methylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010
EtFOSE- N-Ethylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: L0020078-30; 45-3
Date of Extraction: 1/27/2010
Date Analyzed: 1/28/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	ND	1.00
8-2 FTOH	ND	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Fluorochemical Residues in Water Samples By LC/MS/MS

Sample ID: L0020078-31; 46-1

Analyte	Amount Found (ng/mL)	LOD (ng/mL)	Analysis Date
C4 Acid- Perfluorobutyric Acid	ND	0.0125	1/29/2010
C5 Acid- Perfluoropentanoic Acid	ND	0.0125	1/29/2010
C6 Acid- Perfluorohexanoic Acid	0.0256	0.0125	1/29/2010
C7 Acid- Perfluoroheptanoic Acid	ND	0.0125	1/29/2010
C8 Acid- Perfluorooctanoic Acid	0.128	0.0125	1/29/2010
C9 Acid- Perfluorononanoic Acid	ND	0.0125	1/29/2010
C10 Acid- Perfluorodecanoic Acid	0.0306	0.0125	1/29/2010
C11 Acid- Perfluoroundecanoic Acid	ND	0.0125	1/29/2010
C12 Acid- Perfluorododecanoic Acid	ND	0.0125	1/29/2010
C13 Acid- Perfluorotridecanoic Acid	ND	0.0125	1/29/2010
C14 Acid- Perfluorotetradecanoic Acid	ND	0.0125	1/29/2010
PFBS- Perfluorobutanesulfonate	ND	0.0125	1/29/2010
PFHS- Perfluorohexanesulfonate	ND	0.0125	1/29/2010
PFOS- Perfluorooctanesulfonate	ND	0.0125	1/29/2010
FOSA- Perfluorooctane sulfonamide	ND	0.0125	1/29/2010
PFHpS- Perfluoroheptanesulfonate	ND	0.0125	1/29/2010
PFDS- Perfluorodecanesulfonate	ND	0.0125	1/29/2010
MeFOSAA- 2(N-Methylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
EtFOSAA- 2(N-Ethylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
MeFOSE- N-Methylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010
EtFOSE- N-Ethylperfluorooctane sulfonamidoethanol	0.137	0.0125	1/28/2010

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: L0020078-33; 46-3
Date of Extraction: 1/27/2010
Date Analyzed: 1/28/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	ND	1.00
8-2 FTOH	1.40	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Fluorochemical Residues in Water Samples By LC/MS/MS

Sample ID: L0020078-34; SD1

Analyte	Amount Found (ng/mL)	LOD (ng/mL)	Analysis Date
C4 Acid- Perfluorobutyric Acid	ND	0.0125	1/29/2010
C5 Acid- Perfluoropentanoic Acid	ND	0.0125	1/29/2010
C6 Acid- Perfluorohexanoic Acid	ND	0.0125	1/29/2010
C7 Acid- Perfluoroheptanoic Acid	ND	0.0125	1/29/2010
C8 Acid- Perfluorooctanoic Acid	ND	0.0125	1/29/2010
C9 Acid- Perfluorononanoic Acid	ND	0.0125	1/29/2010
C10 Acid- Perfluorodecanoic Acid	ND	0.0125	1/29/2010
C11 Acid- Perfluoroundecanoic Acid	ND	0.0125	1/29/2010
C12 Acid- Perfluorododecanoic Acid	ND	0.0125	1/29/2010
C13 Acid- Perfluorotridecanoic Acid	ND	0.0125	1/29/2010
C14 Acid- Perfluorotetradecanoic Acid	ND	0.0125	1/29/2010
PFBS- Perfluorobutanesulfonate	ND	0.0125	1/29/2010
PFHS- Perfluorohexanesulfonate	ND	0.0125	1/29/2010
PFOS- Perfluorooctanesulfonate	0.0319	0.0125	1/29/2010
FOSA- Perfluorooctane sulfonamide	ND	0.0125	1/29/2010
PFHpS- Perfluoroheptanesulfonate	ND	0.0125	1/29/2010
PFDS- Perfluorodecanesulfonate	ND	0.0125	1/29/2010
MeFOSAA- 2(N-Methylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
EtFOSAA- 2(N-Ethylperfluorooctanesulfonamido) acetic acid	ND	0.0125	1/28/2010
MeFOSE- N-Methylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010
EtFOSE- N-Ethylperfluorooctane sulfonamidoethanol	ND	0.0125	1/28/2010

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: L0020078-36; SD3
Date of Extraction: 2/12/2010
Date Analyzed: 2/12/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	ND	1.00
8-2 FTOH	ND	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Recovery Summary of Fluorochemical Residues in Water Samples

Sample Description	C4 Acid Amount Spiked (ng/mL)	C4 Acid Amt Found in Sample (ng/mL)	C4 Acid Amount Recovered (ng/mL)	C4 Acid Recovery (%)	C5 Acid Amt Found in Sample (ng/mL)	C5 Acid Amount Recovered (ng/mL)	C5 Acid Recovery (%)	C6 Acid Amt Found in Sample (ng/mL)	C6 Acid Amount Recovered (ng/mL)	C6 Acid Recovery (%)
Reagent Spike A 0.1 ng/mL (Dataset 012810D)	0.100	ND	0.104	104	ND	0.103	103	ND	0.0991	99
Reagent Spike B 1.0 ng/mL (Dataset 012810D)	1.00	ND	0.894	89	ND	1.03	103	ND	1.01	101
36-1 Spike C (L20078-1 Spk C, 1.0 ng/mL Lab Spike) Dataset 012810D	1.00	ND	0.703	70	ND	0.755	76	ND	0.886	89
Reagent Spike A 0.1 ng/mL (Dataset 020110A)	0.100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Reagent Spike B 1.0 ng/mL (Dataset 020110A)	1.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
36-1 Spike C (L20078-1 Spk C, 1.0 ng/mL Lab Spike) Dataset 020110A	1.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Sample Description	C7 Acid Amount Spiked (ng/mL)	C7 Acid Amt Found in Sample (ng/mL)	C7 Acid Amount Recovered (ng/mL)	C7 Acid Recovery (%)	C8 Acid Amt Found in Sample (ng/mL)	C8 Acid Amount Recovered (ng/mL)	C8 Acid Recovery (%)	C9 Acid Amt Found in Sample (ng/mL)	C9 Acid Amount Recovered (ng/mL)	C9 Acid Recovery (%)
Reagent Spike A 0.1 ng/mL (Dataset 012810D)	0.100	ND	0.0901	90	ND	0.0952	95	ND	0.0894	89
Reagent Spike B 1.0 ng/mL (Dataset 012810D)	1.00	ND	0.952	95	ND	0.898	90	ND	0.904	90
36-1 Spike C (L20078-1 Spk C, 1.0 ng/mL Lab Spike) Dataset 012810D	1.00	N/A	N/A	N/A	ND	1.19	119	N/A	N/A	N/A
Reagent Spike A 0.1 ng/mL (Dataset 020110A)	0.100	ND	0.0922	92	N/A	N/A	N/A	ND	0.102	102
Reagent Spike B 1.0 ng/mL (Dataset 020110A)	1.00	ND	1.01	101	N/A	N/A	N/A	ND	1.02	102
36-1 Spike C (L20078-1 Spk C, 1.0 ng/mL Lab Spike) Dataset 020110A	1.00	ND	1.66	166^	N/A	N/A	N/A	ND	1.73	173^

ND = Not detected = Response is below the LOD of 0.0125 ng/mL.
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^ Confirmation analysis Laboratory Matrix Spike recovery is outside the acceptance criteria of 70 - 130% due to matrix effect

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Analytical Report

Recovery Summary of Fluorochemical Residues in Water Samples

Sample Description	C10 Acid				C11 Acid			C12 Acid		
	Amount Spiked (ng/mL)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)
Reagent Spike A 0.1 ng/mL (Dataset 012810D)	0.100	ND	0.0927	93	ND	0.0901	90	ND	0.0965	97
Reagent Spike B 1.0 ng/mL (Dataset 012810D)	1.00	ND	0.849	85	ND	1.00	100	ND	1.04	104
36-1 Spike C (L20078-1 Spk C, 1.0 ng/mL Lab Spike) Dataset 012810D	1.00	ND	0.898	90	ND	1.11	111	N/A	N/A	N/A
Reagent Spike A 0.1 ng/mL (Dataset 020110A)	0.100	N/A	N/A	N/A	N/A	N/A	N/A	ND	0.0936	94
Reagent Spike B 1.0 ng/mL (Dataset 020110A)	1.00	N/A	N/A	N/A	N/A	N/A	N/A	ND	1.09	109
36-1 Spike C (L20078-1 Spk C, 1.0 ng/mL Lab Spike) Dataset 020110A	1.00	N/A	N/A	N/A	N/A	N/A	N/A	ND	0.851	85

Sample Description	C13 Acid				C14 Acid		
	Amount Spiked (ng/mL)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)
Reagent Spike A 0.1 ng/mL (Dataset 012810D)	0.100	ND	0.0983	98	ND	0.0995	100
Reagent Spike B 1.0 ng/mL (Dataset 012810D)	1.00	ND	0.949	95	ND	0.996	100
36-1 Spike C (L20078-1 Spk C, 1.0 ng/mL Lab Spike) Dataset 012810D	1.00	N/A	N/A	N/A	ND	0.907	91
Reagent Spike A 0.1 ng/mL (Dataset 020110A)	0.100	ND	0.103	103	N/A	N/A	N/A
Reagent Spike B 1.0 ng/mL (Dataset 020110A)	1.00	ND	1.07	107	N/A	N/A	N/A
36-1 Spike C (L20078-1 Spk C, 1.0 ng/mL Lab Spike) Dataset 020110A	1.00	ND	0.709	71	N/A	N/A	N/A

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Analytical Report

Recovery Summary of Fluorochemical Residues in Water Samples

Sample Description	PFBS Amount Spiked (ng/mL)	PFBS Amt Found in Sample (ng/mL)	PFBS Amount Recovered (ng/mL)	PFBS Recovery (%)	PFHS Amt Found in Sample (ng/mL)	PFHS Amount Recovered (ng/mL)	PFHS Recovery (%)	PFOS Amt Found in Sample (ng/mL)	PFOS Amount Recovered (ng/mL)	PFOS Recovery (%)
Reagent Spike A 0.1 ng/mL (Dataset 012810D)	0.100	ND	0.0931	93	ND	0.0956	96	ND	0.0964	96
Reagent Spike B 1.0 ng/mL (Dataset 012810D)	1.00	ND	0.821	82	ND	0.878	88	ND	0.933	93
36-1 Spike C (L20078-1 Spk C, 1.0 ng/mL Lab Spike) Dataset 012810D	1.00	ND	0.794	79	ND	0.828	83	2.56	3.31	75

Sample Description	FOSA Amount Spiked (ng/mL)	FOSA Amt Found in Sample (ng/mL)	FOSA Amount Recovered (ng/mL)	FOSA Recovery (%)	PFHpS Amt Found in Sample (ng/mL)	PFHpS Amount Recovered (ng/mL)	PFHpS Recovery (%)	PFDS Amt Found in Sample (ng/mL)	PFDS Amount Recovered (ng/mL)	PFDS Recovery (%)
Reagent Spike A 0.1 ng/mL (Dataset 012810D)	0.100	ND	0.102	102	N/A	N/A	N/A	N/A	N/A	N/A
Reagent Spike B 1.0 ng/mL (Dataset 012810D)	1.00	ND	0.969	97	N/A	N/A	N/A	N/A	N/A	N/A
36-1 Spike C (L20078-1 Spk C, 1.0 ng/mL Lab Spike) Dataset 012810D	1.00	ND	0.748	75	N/A	N/A	N/A	N/A	N/A	N/A
Reagent Spike A 0.1 ng/mL (Dataset 012810F)	0.100	N/A	N/A	N/A	ND	0.0913	91	ND	0.0918	92
Reagent Spike B 1.0 ng/mL (Dataset 020110F)	1.00	N/A	N/A	N/A	ND	0.951	95	ND	0.893	89
36-1 Spike C (L20078-1 Spk C, 1.0 ng/mL Lab Spike) Dataset 020110F	1.00	N/A	N/A	N/A	N/A	N/A	N/A	ND	1.18	118
Reagent Spike A 0.1 ng/mL (Dataset 020110B)	0.100	N/A	N/A	N/A	ND	0.0927	93	N/A	N/A	N/A
Reagent Spike B 1.0 ng/mL (Dataset 020110B)	1.00	N/A	N/A	N/A	ND	0.905	91	N/A	N/A	N/A
36-1 Spike C (L20078-1 Spk C, 1.0 ng/mL Lab Spike) Dataset 020110B	1.00	N/A	N/A	N/A	ND	0.737	74	N/A	N/A	N/A

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Analytical Report

Recovery Summary of Fluorochemical Residues in Water Samples

Sample Description	MeFOSAA Amount Spiked (ng/mL)	MeFOSAA Amt Found in Sample (ng/mL)	MeFOSAA Amount Recovered (ng/mL)	MeFOSAA Recovery (%)	EtFOSAA Amt Found in Sample (ng/mL)	EtFOSAA Amount Recovered (ng/mL)	EtFOSAA Recovery (%)
Reagent Spike A 0.1 ng/mL (Dataset 012810E)	0.100	ND	0.103	103	ND	0.110	110
Reagent Spike B 1.0 ng/mL (Dataset 012810E)	1.00	ND	1.02	102	ND	1.01	101
36-1 Spike C (L20078-1 Spk C, 0.1 ng/mL Lab Spike) Dataset 012810E	0.100	ND	0.113	113	ND	0.114	114
Reagent Spike A 0.1 ng/mL (Dataset 020110C)	0.100	N/A	N/A	N/A	N/A	N/A	N/A
Reagent Spike B 1.0 ng/mL (Dataset 020110C)	1.00	N/A	N/A	N/A	N/A	N/A	N/A
36-1 Spike C (L20078-1 Spk C, 0.1 ng/mL Lab Spike) Dataset 020110C	0.100	N/A	N/A	N/A	N/A	N/A	N/A

Sample Description	MeFOSE Amount Spiked (ng/mL)	MeFOSE Amt Found in Sample (ng/mL)	MeFOSE Amount Recovered (ng/mL)	MeFOSE Recovery (%)	EtFOSE Amt Found in Sample (ng/mL)	EtFOSE Amount Recovered (ng/mL)	EtFOSE Recovery (%)
Reagent Spike A 0.1 ng/mL (Dataset 012810E)	0.100	ND	0.0982	98	ND	0.102	102
Reagent Spike B 1.0 ng/mL (Dataset 012810E)	1.00	ND	0.956	96	ND	1.00	100
36-1 Spike C (L20078-1 Spk C, 0.1 ng/mL Lab Spike) Dataset 012810E	0.100	N/A	N/A	N/A	N/A	N/A	N/A
Reagent Spike A 0.1 ng/mL (Dataset 020110C)	0.100	ND	0.113	113	ND	0.113	113
Reagent Spike B 1.0 ng/mL (Dataset 020110C)	1.00	ND	1.01	101	ND	0.980	98
36-1 Spike C (L20078-1 Spk C, 0.1 ng/mL Lab Spike) Dataset 020110C	0.100	ND	0.0256	26^	ND	0.0218	22^

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^ Confirmation analysis of Laboratory Matrix Spike recovery is outside the acceptance criteria of 70 - 130% from matrix effect.

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: Lab Contol Spike
Date of Extraction: 1/27/2010
Date Analyzed: 1/28/2010

Analyte	Amount Found (ng/mL)	Amount Spiked (ng/mL)	LOQ (ng/mL)	% Recovery
7-2s FTOH	3.50	5.00	1.00	70
6-2 FTOH	3.30	4.94	1.00	67
8-2 FTOH	3.40	5.11	1.00	67
10-2 FTOH	3.20	5.03	1.00	64

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: Lab Contol Spike Duplicate
Date of Extraction: 1/27/2010
Date Analyzed: 1/28/2010

Analyte	Amount Found (ng/mL)	Amount Spiked (ng/mL)	LOQ (ng/mL)	% Recovery	% RPD
7-2s FTOH	3.20	5.00	1.00	64	9.0
6-2 FTOH	3.00	4.94	1.00	61	9.5
8-2 FTOH	3.10	5.11	1.00	61	9.2
10-2 FTOH	3.00	5.03	1.00	60	6.5

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: Lab Contol Spike
Date of Extraction: 2/12/2010
Date Analyzed: 2/12/2010

Analyte	Amount Found (ng/mL)	Amount Spiked (ng/mL)	LOQ (ng/mL)	% Recovery
7-2s FTOH	3.30	5.00	1.00	66
6-2 FTOH	3.00	4.94	1.00	61
8-2 FTOH	3.10	5.11	1.00	61
10-2 FTOH	2.90	5.03	1.00	58

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: Lab Contol Spike Duplicate
Date of Extraction: 2/12/2010
Date Analyzed: 2/12/2010

Analyte	Amount Found (ng/mL)	Amount Spiked (ng/mL)	LOQ (ng/mL)	% Recovery	% RPD
7-2s FTOH	3.10	5.00	1.00	62	6.2
6-2 FTOH	2.90	4.94	1.00	59	3.4
8-2 FTOH	3.00	5.11	1.00	59	3.3
10-2 FTOH	2.80	5.03	1.00	56	3.5

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: L0020078-6; 37-3 Matrix Spike
Date of Extraction: 1/27/2010
Date Analyzed: 1/28/2010

Analyte	Amount Found (ng/mL)	Amount Spiked (ng/mL)	LOQ (ng/mL)	% Recovery
7-2s FTOH	2.70	5.00	1.00	54
6-2 FTOH	3.00	4.94	1.00	61
8-2 FTOH	2.80	5.11	1.00	55
10-2 FTOH	2.00	5.03	1.00	40

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: Method Blank
Date of Extraction: 1/27/2010
Date Analyzed: 1/28/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	ND	1.00
8-2 FTOH	ND	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Fluorotelomer Analysis by GC/MS

Sample ID: Method Blank
Date of Extraction: 2/12/2010
Date Analyzed: 2/12/2010

Analyte	Amount Found (ng/mL)	LOQ (ng/mL)
7-2s FTOH	ND	1.00
6-2 FTOH	ND	1.00
8-2 FTOH	ND	1.00
10-2 FTOH	ND	1.00

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Analytical Report

Recovery Summary of ^{13}C PFOA (m+4) in Water Samples

Client Sample ID	MPI Sample ID	Amount Spiked (ng/mL, ppb)	Amount Recovered (ng/mL, ppb)	Recovery (%)
N/A	Reagent Control	1.00	0.947	95
N/A	Reagent Spike A	0.100	0.0932	93
N/A	Reagent Spike B	1.00	0.939	94
36-1 Spike C	L20078-1 Spk C	1.00	0.955	96
36-1	L20078-1	1.00	0.842	84
37-1	L20078-4	1.00	0.856	86
38-1	L20078-7	1.00	0.850	85
39-1	L20078-10	1.00	0.880	88
40-1	L20078-13	1.00	0.737	74
41-1	L20078-16	1.00	0.899	90
42-1	L20078-19	1.00	0.813	81
43-1	L20078-22	1.00	0.847	85
44-1	L20078-25	1.00	0.880	88
45-1	L20078-28	1.00	0.841	84
46-1	L20078-31	1.00	0.845	85
SD1	L20078-34	1.00	0.828	83

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Recovery Summary of 8:1 FTOH in Water Samples

Client Sample ID	MPI Sample ID	Amount Spiked (ng/mL, ppb)	Amount Recovered (ng/mL, ppb)	Recovery (%)
N/A	Method Blank (1/27/10)	5.00	2.90	58
N/A	LCS (1/27/10)	5.00	3.00	60
N/A	LCSD (1/27/10)	5.00	2.80	56
N/A	Method Blank (2/12/10)	5.00	2.80	56
N/A	LCS (2/12/10)	5.00	2.50	50
N/A	LCSD (2/12/10)	5.00	2.40	48
36-3	L20078-3	5.00	1.60	32
36-3 Duplicate	L20078-3	5.00	1.40	28
37-3	L20078-6	5.00	2.20	44
37-3 Matrix Spike	L20078-6	5.00	2.30	46
38-3	L20078-9	5.00	3.00	60
39-3	L20078-12	5.00	2.90	58
40-3	L20078-15	5.00	3.00	60
41-3	L20078-18	5.00	2.40	48
42-3	L20078-21	5.00	2.30	46
43-3	L20078-24	5.00	2.90	58
44-3	L20078-27	5.00	2.70	54
45-3	L20078-30	5.00	1.00	20
46-3	L20078-33	5.00	3.20	64
SD3	L20078-36	5.00	0.20	4